

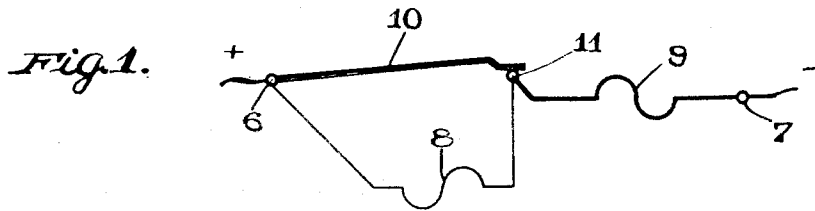
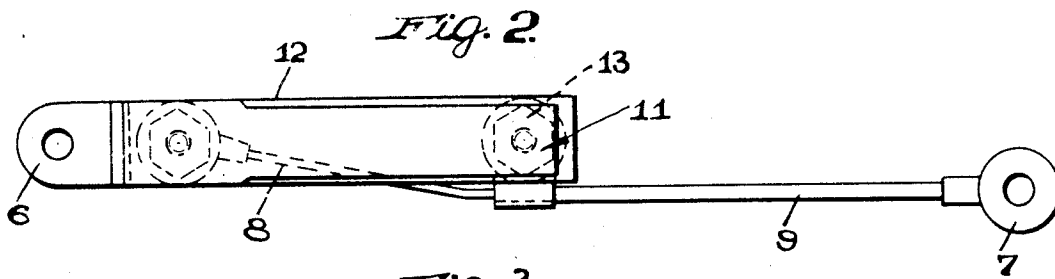
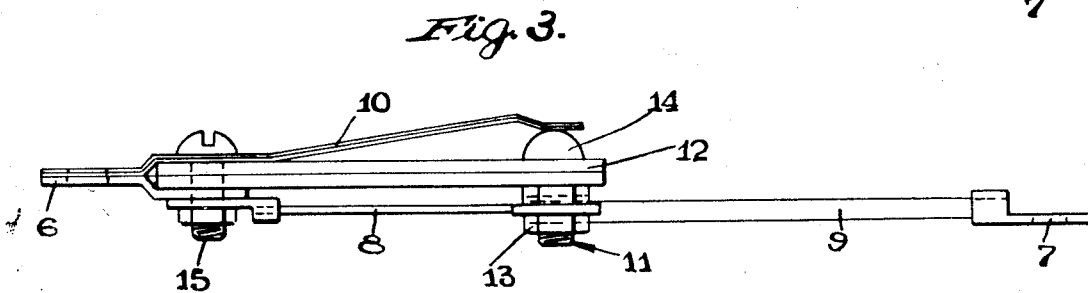
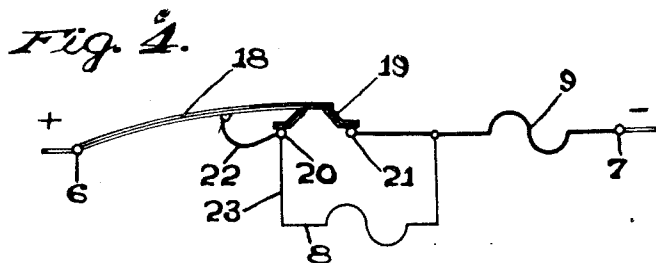
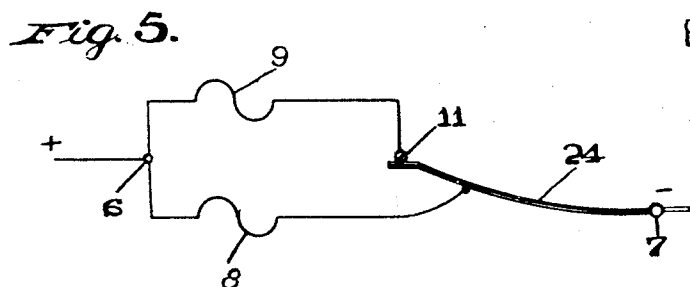
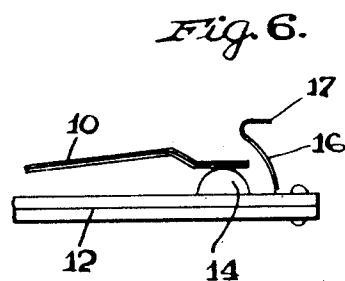
Dec. 14, 1937.

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2,102,204

FUSE PROTECTIVE CIRCUIT

Filed June 20, 1936



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2,102,204

FUSE PROTECTIVE CIRCUIT

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Application June 20, 1936, Serial No. 86,252

1 Claim. (Cl. 175-294)

The invention relates to fuses and has for its principal objects the provision of an improved fuse construction which will afford overload protection and short circuit protection. The ordinary fuse construction employed for short circuit protection does not provide any protection against overload, because the ampere carrying capacity of the fuse is usually several times the normal full load current of the apparatus with which it is connected. Such fuses are ordinarily used to protect the wiring system and service against a serious fault current caused by the apparatus connected to the system through the fuse, and in this case, the apparatus would be damaged before the fuse would blow. When a fuse is used for overload protection, it is so proportioned to the ampere capacity of the apparatus that the fuse will blow before the apparatus is damaged. In this case, the fuse will blow on a momentary current increase which would in no way damage the apparatus. The object of the present invention is to provide both overload and short circuit protection and obtain a time delay action for overload, so that the overload fuse will not blow on a momentary increase in current, such as that above referred to, the time delay being adjusted to suit the characteristics of the apparatus to be protected. In its preferred form, the assembly involves the use of two fuses in series, one proportioned to the overload and the other proportioned to the desired short circuit protection, arranged so as to give a time delay action for the overload. The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a diagrammatic view showing one arrangement of the device. Figs. 2 and 3 are detail views showing the fuse link assembly. Figs 4 and 5 are views similar to that of Fig. 1 showing alternative arrangements. And Fig. 6 is a detail view showing a modification of the switch construction.

Referring to Figs. 1, 2 and 3, the numerals 6 and 7 designate the terminals of a circuit in which the fuse construction is located; 8 and 9 are the two fuse wires arranged in series in the circuit, 8 being the overload protecting fuse and 9 the short circuit protecting fuse; and 10 is a thermal switch arm in shunt with respect to the fuse 8 and making contact, when in the closed position shown in Figs. 1 and 3, with the member 11.

The overload fuse 8 is proportioned so that it will blow with a current load which is substantially lower than that at which the fuse 9 will blow. It is designed to protect the apparatus

connected with the circuit, while the fuse 9 is designed to protect the wiring system from injury in case of a short circuit or other accident throwing a heavy load on the circuit.

Under a normal current load, the switch 10 is in closed position, but it is of the type which will open automatically upon a predetermined increase in load above normal. In the present instance, it is a thermal arm, well known in the art, consisting of two metals arranged so that when the current load reaches a certain point, the heating of the metals causes the arm to bend so that its end is separated from the member 11. The switch is so designed that when a momentary increase in load occurs in the circuit sufficient to blow the overload fuse 8 (if the switch were not in shunt therewith) but not sufficient to injure the apparatus connected to the system, the arm will heat up and open, thus causing the full current flow to pass through the fuse 8. Since the surge of current is only momentary, however, the flow is reduced by the time the switch opens, so that the fuse 8 does not blow, and the necessity of replacing it is avoided. The switch thus gives a predetermined, appreciable time delay in exposing the fuse 8 to current surges. A thermal switch is suitable for giving this delayed action, but it will be understood that other types of automatically operating switch devices having a retarded opening might be employed.

One particular fuse link construction is shown in Figs. 2 and 3. As here shown, the fuse wires 8 and 9 are carried by a bar of insulating material 12, such as Bakelite, the two adjacent ends being clamped together at one end of the bar by the member 11 in the form of a bolt carrying the nut 13 at one end and the head 14 at the other end. The head 14 is yieldingly engaged by the free end of the bi-metal switch arm 11 under normal current conditions. The left hand ends of the switch arm and the fuse 8 are clamped on opposite sides of the end of the bar 12 by the bolt 15.

It will be apparent that in the operation of the construction just described, the switch arm will close soon after it opens, since the circuit is through the arm, and when the metals of the arm resume their normal temperature due to the interruption of the current, the arm will return to its original position. In cases in which it is desired to avoid this automatic closure, a latch may be provided, as shown in Fig. 6, to lock the arm in open position. The latch shown is a clip 16 of spring metal whose end 17 will move beneath the end of the arm when such end arrives at a point above the end 17.

Fig. 4 illustrates a modification of the circuit of Fig. 1 in which the thermal switch arm 18 is in the main circuit and is provided with an end 19 which normally bridges the gap between the contact members 20 and 21, a wire 22 serving to connect the shunt circuit 23 carrying the overload protecting fuse 8 with the arm 18. The operation parallels that of the Fig. 1 circuit, as heretofore described.

Fig. 5 illustrates another arrangement, in which the fuses 8 and 9 are in parallel and in which 24 is the thermal switch arm. In case of overload, the switch opens throwing the current through the fuse 9, and the device will function as

heretofore described in connection with the apparatus heretofore described.

What I claim is:

In combination in a fuse assembly, a circuit including a short circuit fuse and a thermal switch in series, and an overload fuse in shunt with said short circuit fuse and the switch, said switch being adapted to remain in closed position under normal current load but to open after a predetermined time interval upon an increase in current load above normal so that with the switch in open position, a full current flow occurs through the overload fuse.

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